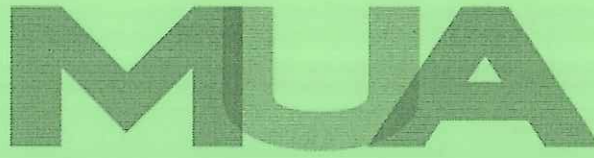


The
Management
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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF ARTS IN DEVELOPMENT STUDIES

BDS 109 : STATISTICS

DATE: 2ND AUGUST 2018

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. Write all your answers in the Examination answer booklet provided.

QUESTION ONE

- a. Explain the steps in a statistical investigation (5 marks)
- b. What are some of the limitations of index numbers? (3 marks)
- c. The following data gives the amounts (in dollars) spent on groceries by 40 housewives during a week.

22	12	9	8	33	32	30	33	8	11
21	16	12	15	37	30	16	22	12	24
18	25	37	16	25	28	25	18	9	28
25	28	26	15	12	35	38	16	24	31

Required

- i. Construct a frequency distribution using seven classes. (5 marks)
- ii. Construct a histogram and a frequency polygon (4 marks)
- d. A machine comprises of 3 transformers A, B and C. The machine may operate if at least 2 transformers are working. The probability of each transformer working are given as shown below;

$$P(A) = 0.6, \quad P(B) = 0.5, \quad P(C) = 0.7$$

A mechanical engineer went to inspect the working conditions of those transformers. Find the probabilities of having the following outcomes

- i. Only one transformer operating (3 marks)
- ii. Two transformers are operating (3 marks)
- iii. All three transformers are operating (2 marks)

QUESTION TWO

The following table indicates the marks obtained by students in a statistics test.

Marks	Number of students
0 – 20	5
20 – 40	7
40 – 60	-
60 – 80	8
80 – 100	7

The arithmetic mean for the class was 52.5 marks. You are required to determine the value of:

- i) The missing frequency (5 marks)

- ii) The median mark (2 marks)
- iii) The modal mark (2 marks)
- iv) The standard deviation (4 marks)
- v) The coefficient of skewness (2 marks)

QUESTION THREE

The following prices and quantities reflect the average weekly consumption patterns of a certain family for the years 2016 and 2017.

Item	Year 2016		Year 2017	
	Price (p_0) Sh.	Quantity (q_0)	Price (p_1) Sh.	Quantity (q_1)
Oranges (Kg)	15	2	25	1
Milk (Litres)	30	2	35	2
Bread (Loafs)	30	3	40	3
Eggs (Dozens)	50	1	65	1

Required:

- (i) Price relatives for each item. (7 marks)
- (ii) Laspeyres price index (4 marks)
- (ii) Paasche price index (4 marks)

QUESTION FOUR

- a. In the context of time series, explain the following terms:
- i. A basic trend. (1 mark)
 - ii. Seasonal fluctuations. (1 mark)
 - iii. Cyclical fluctuations. (1 mark)
 - iv. Residual variations. (1 mark)
- b. The following table gives the quarterly demand for the hotel accommodation, in thousands of beds.

Year	Quarter	1	2	3	4
2014		19.4	20.6	19.5	22.8
2015		22.3	22.6	21.0	24.9
2016		23.3	24.1	22.2	25.6
2017		25.1	27.3		

Required:

The trend and the average seasonal variation of the series. (11 marks)

QUESTION FIVE

250 members of a certain society have voted to elect a new chairman. Each member may vote for either one or two candidates. The candidate elected is the one who polls most votes. Three candidates x, y z stood for election and when the votes were counted, it was found that

59 voted for y only, 37 voted for z only

12 voted for x and y, 14 voted for x and z

147 voted for either x or y or both x and y but not for z

102 voted for y or z or both but not for x

Required

- i. Present the above information in a Venn diagram. **(9 marks)**
- ii. How many voters did not vote? **(2 marks)**
- iii. How many voters voted for x only? **(2 marks)**
- iv. Who won the elections? **(2 marks)**

QUESTION SIX

- a) Explain coefficient of variation and coefficient of determination as used in statistics and explain their interpretation. **(4 marks)**
- b) From the distribution below compute the Geometric mean. **(6 marks)**

Weight in Kgs	115.5	125.5	135.5	145.5	155.5	165.5
No of Students	4	10	14	53	7	12

- c) Calculate the mean deviation from the mean for the following. **(5 marks)**
3,000 4,000 4,200 4,400 4,600 4,800 5,800

FORMULAS

$$\text{Mean} = \frac{\sum X}{n}$$

$$\text{Mean}_r = \frac{\sum FX}{\sum F}$$

$$\text{Z-Formula} = \frac{\text{Mean_Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + \frac{F_1}{F_1 + F_2} \times I$$

or

$$\text{Mode} = L + \left(\frac{D_1}{D_1 + D_2} \right) \cdot c$$

$$\text{Median, } X_d = L + \frac{i}{F} (m - c)$$

or

$$\text{Median} = L + \left(\frac{\frac{N}{2} - F_{m-1}}{f_m} \right) \cdot c$$

$$\text{Variance} = \frac{\sum F(X - \text{mean})^2}{\sum F}$$

or

$$\text{Variance, } S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$$

$$\text{Standard deviation} = \sqrt{\frac{\sum F(x - \text{mean})^2}{\sum F}} \quad \text{or}$$

$$\text{Standard deviation, } S = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$\text{CV} = \frac{\text{SD}}{\text{Mean}} \times 100$$

$$\text{SKp} = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$$

$$S = P(1 + r n)$$

$$S = P(1 + r)^n$$

$$L_P = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100$$

$$F_P = \sqrt{L_P \times P_P}$$

$$L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100$$

$$F_Q = \sqrt{L_Q \times P_Q}$$

$$P_P = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100 \quad P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \times \sqrt{n \sum y^2 - (\sum y)^2}}$$

$$R = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

Regression equation y on x, $y = a + bx$

$$a = \frac{\sum y - b \sum x}{n} \quad b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

Standard Normal Distribution Table

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998